

# Risk Assessment and Risk Management of Contamination in the Aquatic Environment at Fisheries & Oceans Canada Major Facilities in the Pacific Region

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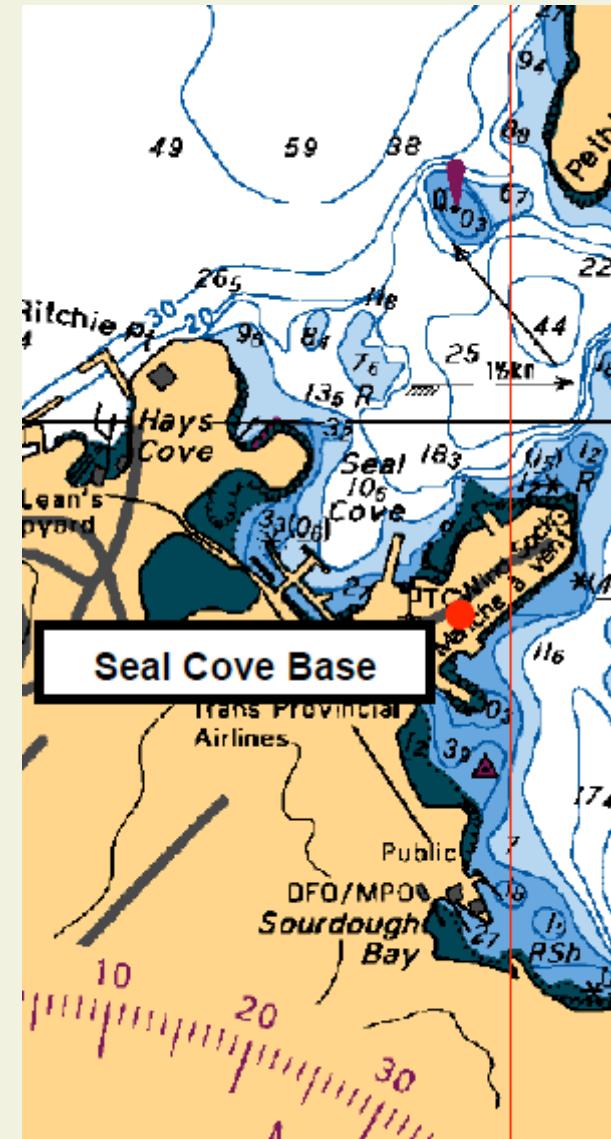
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# Outline

- Overview of Major Facilities
- Introduction to Key Challenges
- Strategy Overview
- Aquatic Risk Assessment
- Risk Management Strategy
- Lessons Learned



# Key Challenges

- Environmental management has been largely reductionist (e.g., focus Site or AEC).
- Sites range in size/complexity.
- Site assessments range in quality and completeness.
- Terrestrial/marine/freshwater.
- Managers faced with unclear decisions.

Solution: a holistic, systematic approach.

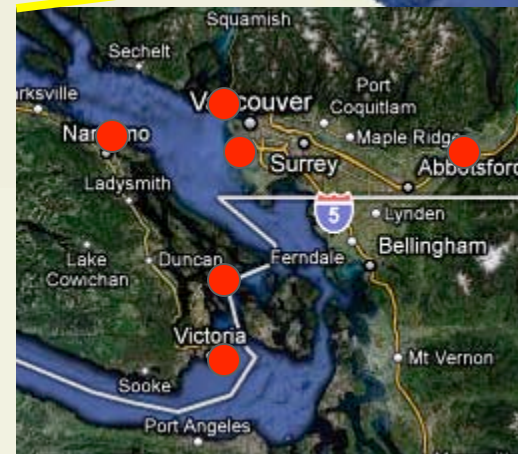
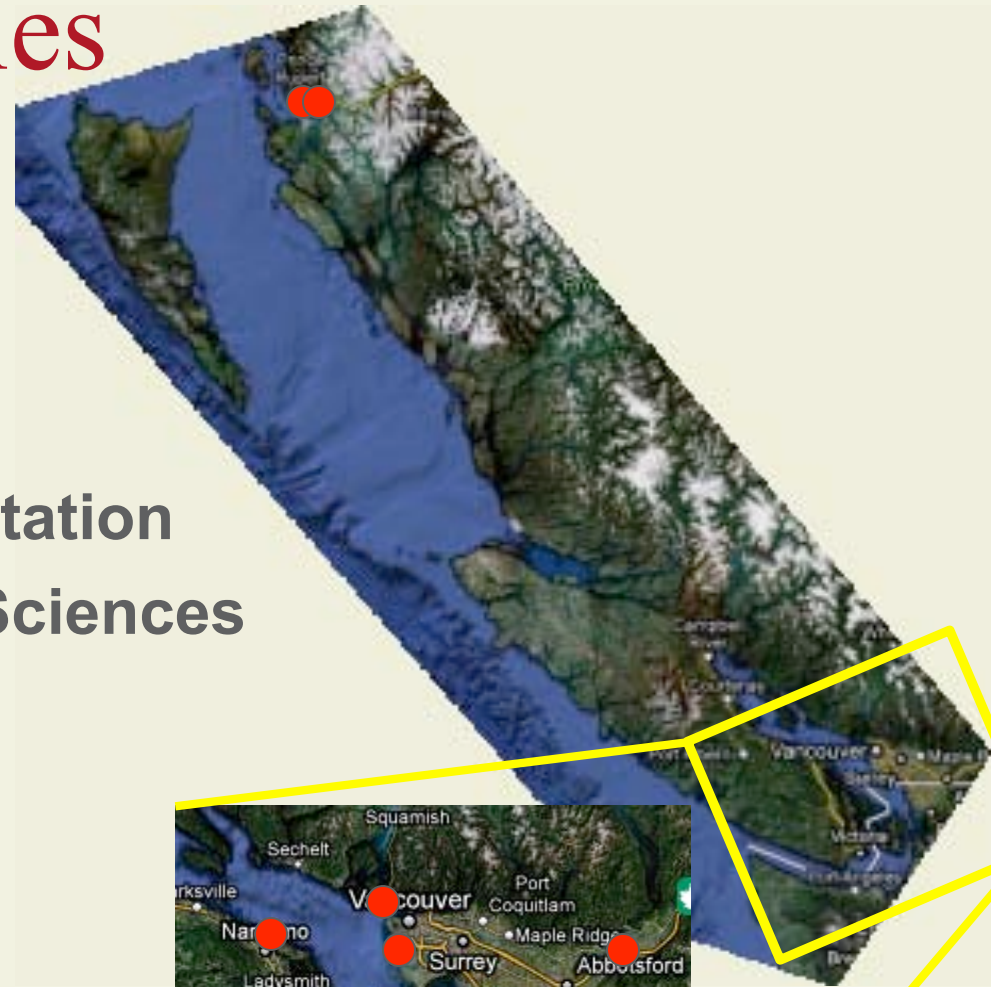


# Major Facilities

Seal Cove Base  
Sourdough Base

Pacific Biological Station  
Institute of Ocean Sciences  
Victoria Base

Cultus Lake Lab  
West Van Lab  
Sea Island Base



# Major Facilities - Operations



Facility	Sea Island Base	Seal Cove Base	Sourdough Base	PBS	IOS	West Vancouver Lab	Victoria Base	Cultus Lake Lab	Facility
				X		X		X	Fish/Aquaculture Rearing
				X	X	X		X	Labs
	X	X	X	X	X	X	X	X	Office space
	X	X	X	X	X	X	X	X	Storage
	X	X	X		X		X		Search and Rescue Operations
		X	X		X		X		Vessel Maintenance
		X	X	X	X	X	X		Vessel Load/Unload
	X	X	X		X		X		Industrial Workshop
		X					X		Buoy Maintenance
		X					X		Helicopter Hangar and Support
								X	Residence

# Major Facilities – Contaminated Sites Aspects

Sea Island Base	X	X	X	X	X	X	X	Fuel Handlings
Seal Cove Base	X	X	X	X	X	X	X	Fuel Storage
Sourdough Base	X	X	X	X	X	X	X	Fill of Unknown Origin
PBS	X	X	X	X	X	X	X	Storm Water Runoff
IOS	X	X	X	X	X	X		Hazardous Materials Storage
West Vancouver Lab	X	X	X	X	X	X		Industrial or Training Activities
Victoria Base	X	X	X	X	X	X		
Cultus Lake Lab	X	X	X	X	X	X		



# Unified RA/RM Strategy

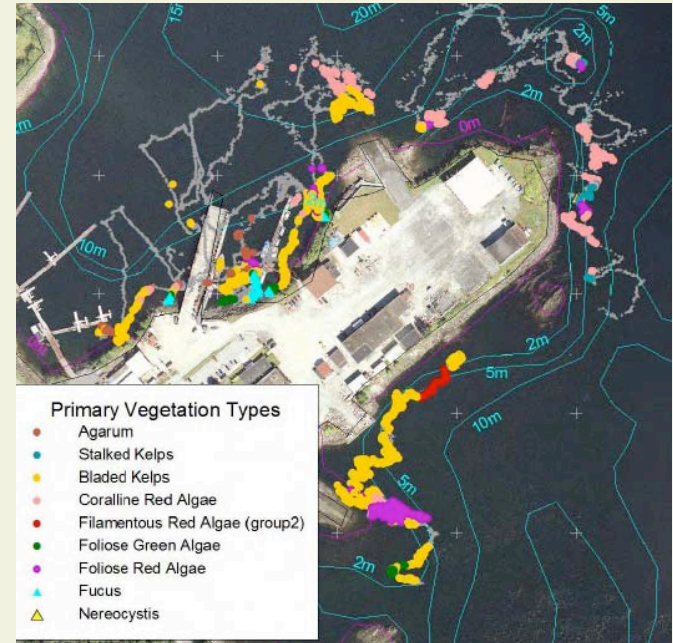
- 5 year program
- Review existing site info and identify gaps
- Track all issues/decisions
- Standardized, defensible site assessment
- Identify issues for priority risk management
- Consistent HHRA and ERA approaches for other issues
- Informed risk management



# Aquatic Ecological Risk Assessment

Tier 1 focused on:

- Data gaps related to contaminant exposure
- Biophysical surveys of subtidal habitats

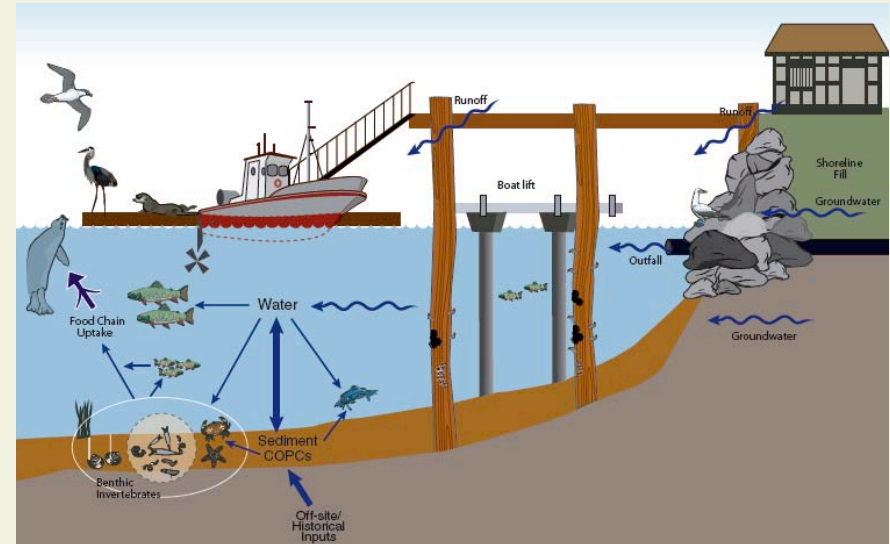


# Aquatic ERA – Tier 2

Consistency in:

- Exposure chemistry
- Toxicity tests
- Tissue chemistry
- Benthic invertebrate community
- Food chain models
- Toxicity reference values
- Statistical analysis
- Uncertainty assessment

## Conceptual Model for Seal Cove Base

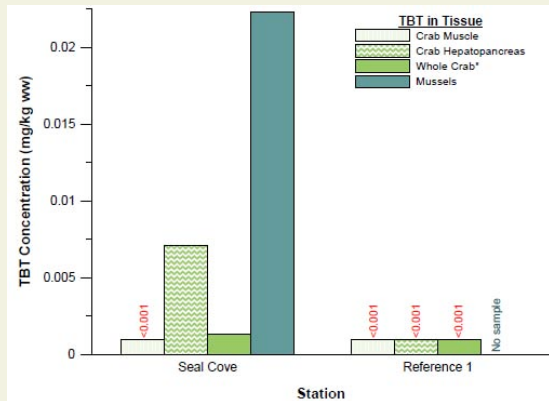
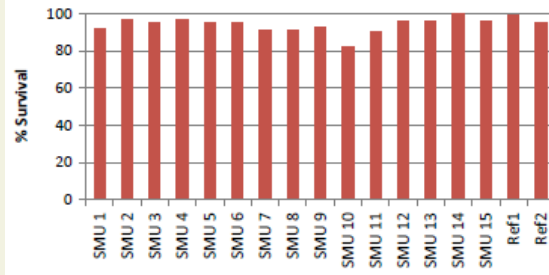


# Aquatic ERA – Tier 2

Near-field survey area 1 (NF1) (see Figure 4)



Amphipod Survival





# Risk Management Strategy

- Address AECs where simple, “low-cost” solutions exist.
- Conduct RA on other AECs.
- For AECs with unacceptable risks, develop further control measures to reduce risks.

# Lessons Learned

- Reductionist approaches usually don't work well.
- Program objectives need to be clear to guide a holistic approach.
- Site Manager requires a working knowledge of risk assessment and risk management.
- Approach requires a multidisciplinary team.
- Upfront investment needed to ensure consistency within and among disciplines.
- Engage Expert Support and relevant stakeholders at critical points.

